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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/029,193	12/20/2001	Frank S. Geefay	10010872-1	5393

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EXAMINER

LEE, HSIEN MING

ART UNIT

PAPER NUMBER

2823

DATE MAILED: 12/08/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/029,193	GEEFAY ET AL.	
	Examiner	Art Unit	
	Hsien-Ming Lee	2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 September 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 12-17, 21 and 22 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 12-17, 21 and 22 is/are rejected.
- 7) ☒ Claim(s) 21 and 22 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Remarks

1. Applicants' cancellation to claims 1-11 and 18-20 is acknowledged.
2. Claims 12-17 and 21-22 are pending in the application.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claim 12 is rejected under 35 U.S.C. 102(e) as being anticipated by Morizumi et al.(US 6,485,814).

Morizumi et al., in Figs.4-5 and related text, teach the claimed semiconductor device, comprising:

- a wafer 6 of resistive semiconductor material (i.e. ceramic, col. 3, line 59) having a through-hole 10, a front side (i.e. top side), and a back side (i.e. bottom side), wherein the width of the through-hole 10 increases from a minimum width on one side (i.e. top side) to a maximum width on the other side (i.e. bottom side);
- a front contact 8 on the front side of the wafer 6;
- a back contact 13 (i.e. a portion of 13 that adheres on the bottom side of the wafer 6) on the back side of the wafer 6; and

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- a metal layer 13 (i.e. Au-plated pad) adheres to the inner walls of the through-hole 10 and connects the front contact 8 to the back contact 13.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 13-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morizumi et al in view of Thomas (US 6,326,689).

In re claims 13 and 14, Morizumi et al do not expressly teach that the through-hole 10 is less than 80 microns (claim 13) and 50 microns (claim 14) at its widest.

However, the selection of the widest width of the through-hole is obvious because it is a matter of determining optimum process condition by routine experimentation with a limited number of species. In re Jones, 162 USPQ 224 (CCPA 1955)(the selection of optimum ranges within prior art general conditions is obvious) and In re Boesch, 205 USPQ 215 (CCPA 1980)(discovery of optimum value of result effective variable in a known process is obvious). For example, the selection of the widest width of the through-hole involves a thickness of the wafer and a required width of the contact area for conductive lines formed on the inner walls of the through-hole, as evidenced by Thomas (col. 5, lines 25-30 and 52-59).

Therefore, it would have been obvious to one of the ordinary skill in the art, at the time the invention was made, to optimize the widest width of the through-hole in Morizumi et al with the considerations of wafer thickness and desired contact area, as taught by Thomas, since by

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this manner it would provide a suitable through-hole with desired sloped inner sidewalls to meet required contact area for conductive lines formed on the sloped inner sidewalls.

In re claim 15, Morizumi et al do not expressly teach that the metal layer 13 is at least 1,000 Angstroms thick where the through-hole 10 is the narrowest.

However, the selection of the thickness of the metal layer at the narrowest width of the through-hole is obvious because it is a matter of determining optimum process condition by routine experimentation with a limited number of species. In re Jones, 162 USPQ 224 (CCPA 1955)(the selection of optimum ranges within prior art general conditions is obvious) and In re Boesch, 205 USPQ 215 (CCPA 1980)(discovery of optimum value of result effective variable in a known process is obvious). For example, selection of the thickness of the metal layer at the narrowest width of the through-hole includes the width of desired active region contact, which is equivalent to the aforementioned front contact, as evidenced by Thomas, in which Thomas teaches selecting a suitable thickness of the metal layer 314a and 314b at the narrowest width of the through-hole in considering the required width of the active region contact 310 (Fig. 3A).

Therefore, it would have been obvious to one of the ordinary skill in the art, at the time the invention was made, to optimize the thickness of the metal layer at the narrowest width of the through-hole in Morizumi et al with the considerations of desired active region contact area, as taught by Thomas, since by this manner it would provide a satisfactory contact area for placing integrated circuit die on contacts within a packaging (col. 7, lines 33-39, Thomas).

In re claim 16, Morizumi et al in view of Thomas teach that the metal layer 13 (i.e. Au-plated) is selected from gold.

In re claim 17, Morizumi et al in view of Thomas teach that the metal layer 13 (i.e. Au-plated pad) on the through-hole 10 is partially plated because the metal layer 13 in Morizumi et al is not fully filled in the through-hole 10.

7. Claims 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morizumi et al in view of Hsuan et al. (US 6,352,923).

Morizumi et al do not teach that a slope of the walls of the through-hole 10 is not constant (claim 21) and walls of the through-hole 10 are curved (claim 22).

Hsuan et al., however, in an analogous art, teach a through-hole 52a having a non-constant slop or curved walls, as shown in Figs. 2E-2G, for the purpose of reducing volume and height of packaging (col. 1, lines 59-62, Hsuan et al.).

Therefore, it would have been obvious to one of the ordinary skill in the art, at the time the invention was made, to substitute a constant-slope-wall through-hole of Morizumi et al with the curved-sidewall through-hole of Hsuan et al, since by this manner it would reduce volume and height of packaging (col. 1, lines 59-62, Hsuan et al.).

Claim Objections

8. Claims 21 and 22 are objected to because of the following informalities: lacking antecedent basis, i.e. “**the** slope” (claim 21) and “**the** walls” (claim 22). Appropriate correction is required.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hsien-Ming Lee whose telephone number is 703-305-7341. The examiner can normally be reached on M-F (9:00 ~ 5:00).

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 703-306-2794. The fax phone number for the organization where this application or proceeding is assigned is 703-308-7382.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Hsien-Ming Lee
Examiner
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A handwritten signature in black ink, appearing to read 'Lee', with a stylized flourish extending to the right.

Dec. 1. 2003.